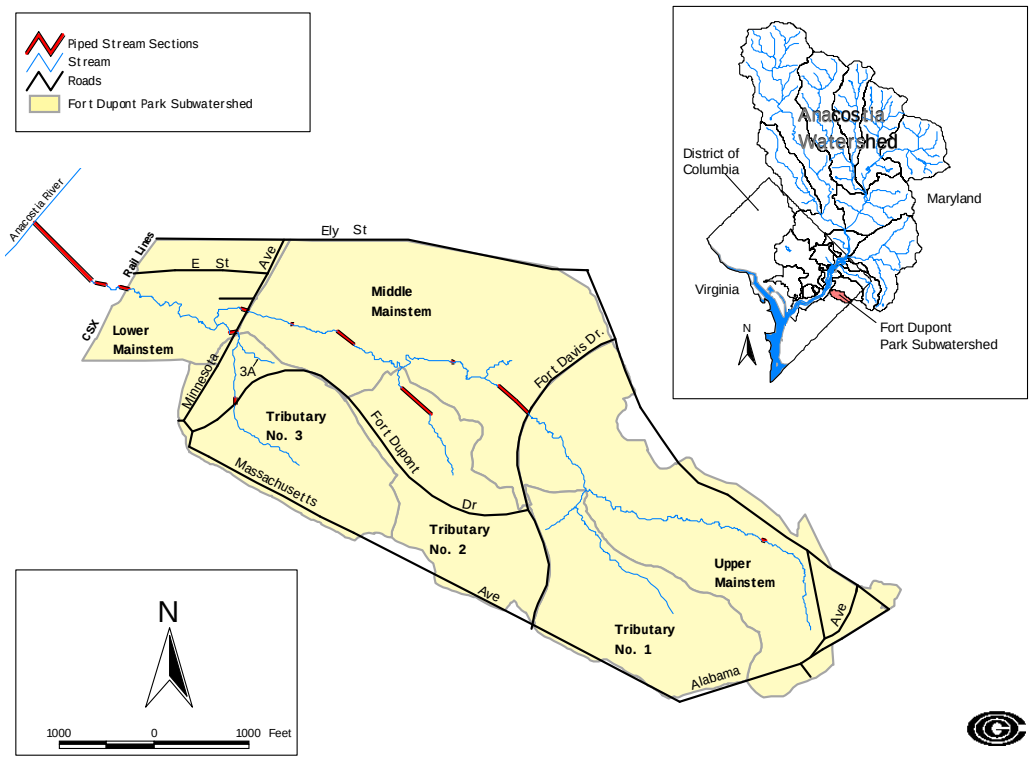
Ft. Dupont
Watershed Implementation Plan

October 2003



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EXECUTIVE SUMMARY

Problem statement:

Ft. Dupont is a 443 ac. (0.69 mi2) tributary to the Anacostia River. The tributary lies entirely within the District of Columbia and originates in the vicinity of Alabama and Burns Avenues. The stream has show severe incision due to concentrated stormwater flows. The stream has downcut over 4 feet in areas and is currently a G5 stream type in its upper reaches. Prior to the effects of the concentrated stormwater, the stream was likely a B5 in the upper reaches. G stream types have a low potential to recover on their own and have low habitat value, due to the lack of instream pools and riffles. An additional consequence of the downcutting has been the lowering of the watertable in the stream buffer area. This may have adverse impacts upon the existing forest and may inhibit forest regeneration in the future.

The downcutting has created unstable banks, that lead to massive bank failure as well as slower erosional processes. Approximately 1.5 miles of the 1.9 mile mainstem has unstable, eroding banks. Sediment contributions to the Anacostia River are evident in the deposition zones immediately upstream of Minnesota Avenue. Nutrient sources are less of a concern, primarily because roughly 85% of the watershed is part of Ft. Dupont National Park. The land cover is eastern deciduous hardwoods and the land use is recreational/preserve lands. The upper portion of the watershed lies in residential areas. Contributions of runoff pollution in the form of oil and associated automobile runoff from Massachusetts Ave., Alabama Ave., Burns Ave. and residential side streets may contribute small amounts of pollutants to the stream. Related to the stormwater flows is the high levels of Cu and Fe in the stream that have been measured during storm events. 1 It is assumed that the high flows mobilize these elements from the stream banks and cause the elevated levels.

An additional problem with Ft. Dupont is the fact that approx. 2,240 linear feet of the stream is piped. The longest piped sections are at the downstream end of the tributary and the section that passes under Ft. Davis drive and the associated fill area. These sections prohibit any fish migration and decrease the habitat area for macroinvertabrates.

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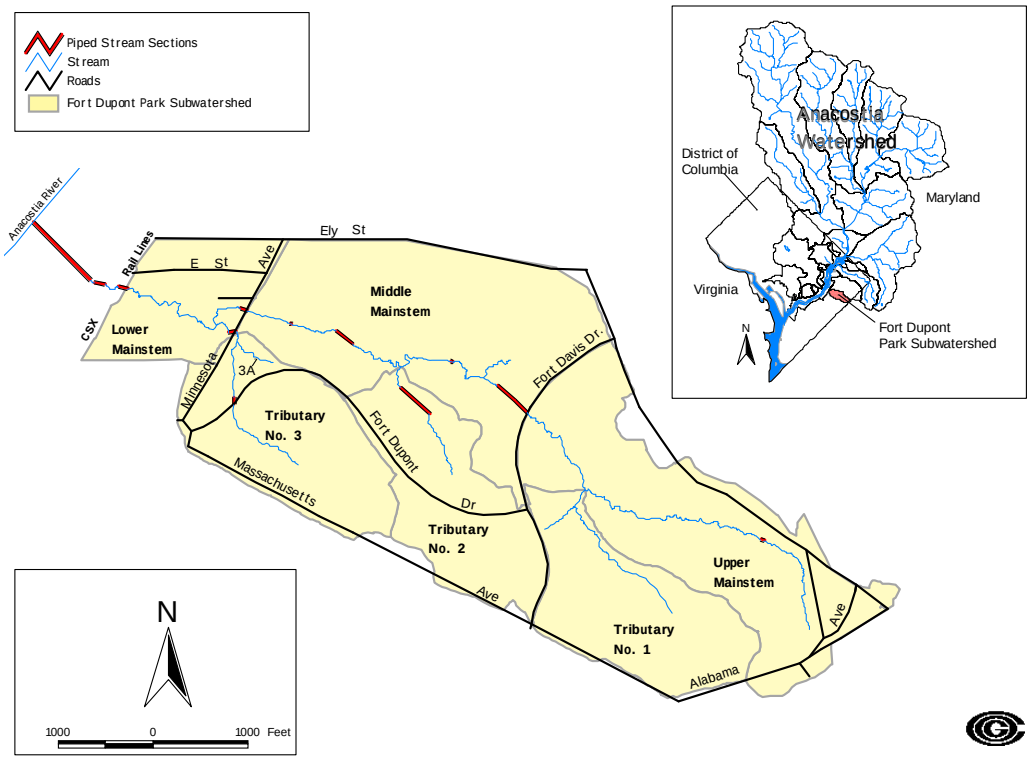
1 Ft. Dupont Subwatershed Restoration: 1999 Baseline Stream Assessment Study - Physical , Chemical and Biological Conditions, MWCOG, April 2000

1.0 DESCRIPTION OF FT DUPONT

The Ft. Dupont tributary is a 3rd order tributary to the Anacostia River. The National Park Service owns aprox. 85% (376 acres) of the land that is drained by Ft. Dupont and its three small tributaries. Roughly 80% of this NPS land is forested by mature eastern hardwoods. The average impervious level in the watershed is 13.3%2, which is located primarily in the headwaters of the watershed. Despite this relatively low level of imperviousness, the impacts of uncontrolled stormwater are clearly evident in the stream channel.



2 Ft. Dupont Subwatershed Restoration: 1999 Baseline Stream Assessment Study - Physical, Chemical and Biological Conditions

1.1 GEOLOGY AND SOIL CONDITIONS

The geology of the Ft. Dupont basin is complex, consisting of a bouquet of Coastal Plain deposits. The general soil associations found in the watershed can be broken down into three broad groups:

Luka-Linside-Codorus
Ft. Dupont itself flows through the Luka-Linside-Codorus association. These are deep, level, and moderately well drained soils that are underlain by stratified alluvial sediment, or man-deposited dredged material on flood plains.

Urban land-Christiana-Sunnyside
The most prevalent general soil association in the District portion of the watershed is the Urban land-Christiana-Sunnyside association. These predominantly upland soils are deep, nearly level to steep, well-drained soils that are underlain by unstable clayey sediment.

Urban land-Galestown-Rumford
A third minor association that Ft. Dupont flows through is the Urban land-Galestown-Rumford association which are deep, nearly level to moderately sloping, and somewhat excessively drained soils that are mostly sandy throughout, and are a part of old terraces.

Several other soil formations are associated with the Watts Branch watershed. In decreasing order of their prevalence, they are:

1) *Patapsco Formation and Arundel Clay (Upper Cretaceous)*
2) *Pamlico Formation and Recent Alluvium (Pleistocene / Recent)*
3) *Wicomico Formation (Pleistocene)*
4) *Brandywine Gravel (Pliocene) Chesapeake Group (Miocene Coastal Plain)*
5) *Aquia Greensand (Eocene)*
6) *Monmouth Formation (Upper Cretaceous)*

Gravels and sand dominate the streambed, although silt and organic deposits are found in shallow pools. The numerous undercut banks in Ft. Dupont bleed clays, and some highly erodible sandy loams.

1.2 FLOW CHARACTERISTICS

Ft. Dupont is a perennial, medium gradient, warm water stream. The stream width varies from 6 feet at the headwaters to 25 feet near Minnesota Avenue. The stream gradient for the upper section is above 2%, high for the District, and flattens significantly in the lower section. The average gradient of the mainstem is 1.9 percent. This gradient is relatively high for coastal plain streams. Based upon a 1999 COG Baseline Stream Survey, the

baseflow averaged 0.1 cfs, however these readings were taken during a drought year where precipitation was well below normal 8 out of 12 months. Stormwater flows were measured in the same survey 10 to 65 cfs. No USGS gauging station exists on Ft. Dupont.

1.3 WATER QUALITY

The basis for the water quality analysis of Fort Dupont is derived from the *District of Columbia's 2002 Water Quality Report* (CWA §305(b)report) *to U.S. EPA and Congress.* The assessment of this tributary is based upon a quarterly sampling at one point near the mouth of the stream. Frequently, data is not collected at this point due to the fact that the stream is dry. According to the report, the water quality of Ft. Dupont is influenced by stormwater and unidentified sources. Pathogens and total toxics are listed as the non-attainment causes. These problems are evidenced by the community structure of the benthic macroinvertebrates, which are dominated by toxics tolerant chironomid midge larvae and organics tolerant oligochaete worms.

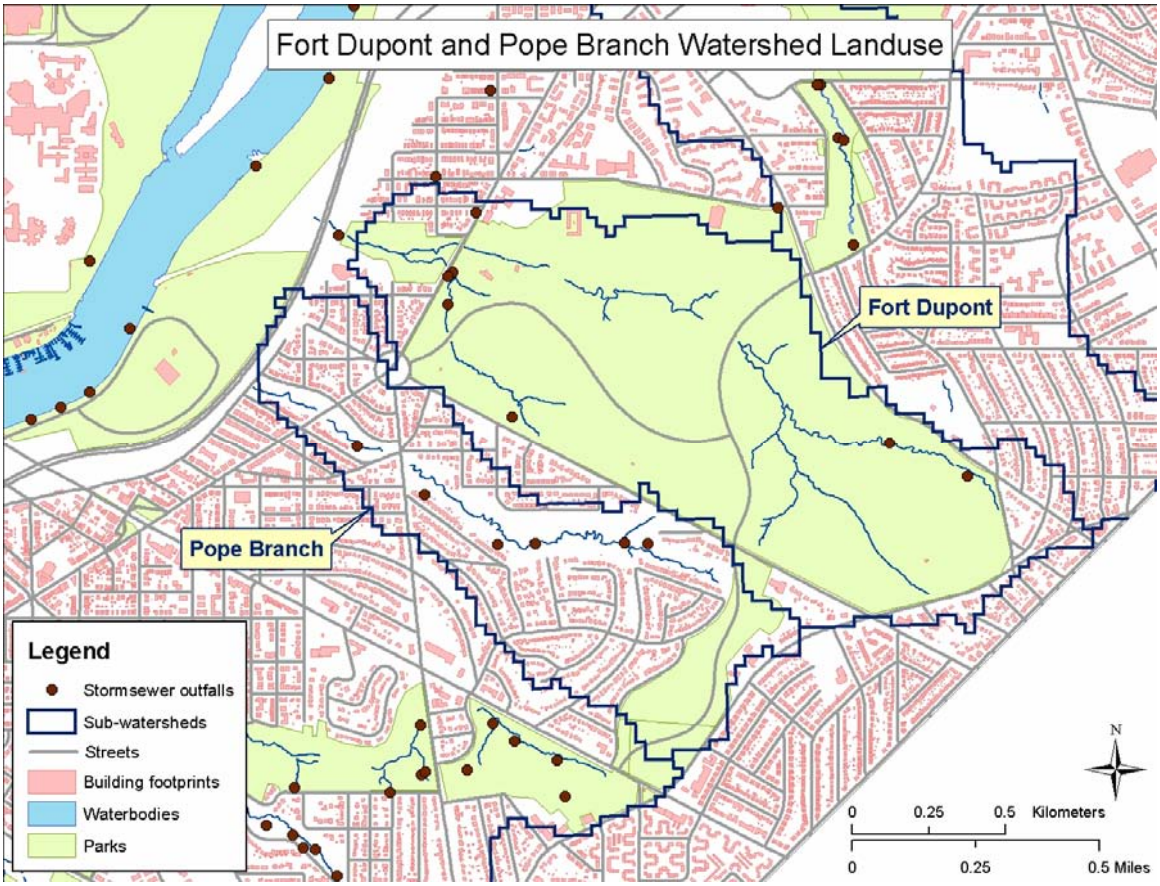
A summary of the designated uses can be found in section 2.4 of this report. It is important to realize that the location and type of sampling can strongly impact the results found in the water quality report. The location of the sampling point is near a major interstate and railroad tracks, and area markedly different from the upper 5/6 of the watershed, which is highly forested. Furthermore, due to the fact that sampling may only be available 8 or 9 months out of the year, the data collected for this report can be highly skewed by one or two samples. Any conclusions taken from this305(b) report should be weighed with these issues in mind.

1.3.1 SEWAGE LEAKS

There are no sewage lines near running near Ft. Dupont tributary. Sewer lines that run along Massachusetts Avenue are not leaking according to field surveys.

1.4 LAND USAGE AND HABITAT CONDITIONS

Land use in the Ft. Dupont watershed will remain unchanged for the foreseeable future given that 90% of the watershed has been set aside as national park. The residential areas have reached build-out, however, certain commercial areas adjacent to Alabama Avenue and Massachusetts Ave may become redeveloped over time.



1.5 BIOLOGICAL INTEGRITY (3)

In 2001, MCOG performed a biological assessment of Ft. Dupont and its tributaries. The following is from the executive summary and details the result of the Rapid Stream Assessment Techniques (RSAT) and MBSS IBI assessment.

1.5.1 BENTHIC MACROINVERTIBRATES

Under the RSAT system, all three Ft. Dupont mainstem reaches (upper, mid, lower) are rated as having fair macroinvertebrate conditions present. Tributary no. 2 (see map under section 1.0) is rated as being good. The fair rating of the mainstem is dependent upon the presence of a few scattered mayflies within the mainstem. Without these few individuals, the rating would slipp to poor. Without exception, the entire mainstem macroinvertebrate community is depauperate, with characteristically poor to fair taxa richness and scarce relative abundances. Tributary no. 2 is rated as being good bordering on fair. The good

3 Metropolitan Washington Council of Governments. April 2000. Ft. Dupont Subwatershed Restoration: 1999 Baseline Stream Assessment Study- Physical, Chemical and Biological Conditions.

rating is heavily influenced by the scarce to common relative abundance of the stonefly *Amphinemura delosa.*

The extremely low numbers of individuals collected from the mainstem belonging to representative pollution intolerant groups (e.g., stoneflies, mayflies and caddisflies) provides additional evidence of generally moderate levels of stream quality impairment. In addition pollution intolerant mayflies and caddisflies are absent throughout the mainstem and the tributaries. With the exception of aquatic flies and midges, all other taxa are present in low numbers.

Both spring and fall MBSS IBI scores for the upper, middle and lower mainstem and Tributary Nos. 1-3 were verbally rated as being very poor (ie. IBI scores < 2.0). In fact, only one sampling site had one metric score in the good range. Importantly, the dominant clinger taxon at Trib. 1 was the pollution tolerant blackfly, *Simulium sp*.. The associated verbal ratings for the scores of the other six metrics for the five remaining stream sites fell into either the poor or fair categories.

1.5.2 FISH

According to a 1998 survey, the only species that use the Ft. Dupont Tributary are extremely small numbers of *Anguilla rostrata,* American Eel. This is understandable given the presence of 14 fish barriers in the tributary. Although the flow is significantly lower in Ft. Dupont, the lower section of nearby Watts Branch supports 9 species of fish.

The species found at Lower Watts Branch include:

Mummichog, *Fundulus heteroclitus*
Mosquitofish, *Gambusia affinis*
Banded Killifish, *Fundulus diaphanus*
Blacknose Dace, *Rhinichthys atratulus*
Bluegill, *Lepomis macrochirus*
Redbreast, *Lepomis megalotis*
American Eel, *Anguilla rostrata*

Brown Bullhead Catfish, *Ictalurus nebulosus*
Tesselated Darter, *Etheostoma olmstedi*

Due to the low baseflow, it is not expected that restoration strategies would allow for the introduction of permanent fish population in the upper reaches. However, daylighting of the lower section could create a tidal stretch of river that would be expected to support fish populations similar to those seen in Watts Branch.

1.6 RIPARIAN BUFFER CONDITIONS

Due to the fact that the stream runs through Ft. Dupont National Park, the buffer conditions are excellent for Ft. Dupont and its tributaries. It is important to realize that despite these excellent to pristine forest conditions adjacent to the stream, the stream has still suffered extreme degradation in channel structure, biological integrity, and water quality.

2.0 VISION

Causes & Solutions:

The causes of the degradation of the Ft. Dupont subwatershed are attributable to the stormwater flows that the stream experiences**.** ***Onsite management of stormwater*** would help:

1. Reduce the erosion rates and
2. Reduce spikes in pollution in the stream through onsite primary stormwater treatment.

The stream will not be able to regain its previous geomorphology from onsite stormwater management alone.

Instream restoration is advocated in order to:

1. Provide habitat features within the stream by establishing the appropriate width/depth ratio that would be found in stream of its type in the Atlantic coastal plain.
2. Provide the stream with a floodplain that would dissipate energy from these frequent storm events, thus reducing the erosive force of the stormwater
3. Raise the water table of the stream and ensure the health of the existing forest in Ft. Dupont Park.
4. Provide an example of how urban streams that have incised from stormwater flows can be restored to conditions that favor macroinvertabrates, fish, and the surrounding riparian ecosystem.


2.1 VISION OF STORMWATER MANAGEMENT

Stormwater management within the Ft. Dupont watershed can different forms and can be implemented by both community residents and contractors of DOH. Given that the impacts of these efforts will only be seen when they are taken upon a broad scale, DOH's efforts should be implemented both as a part of stream restoration efforts and as a separate community based project.

- **Larger stormwater management projects:**
    - Projects such as infiltration trenches and bioretention cells that treat road runoff will be handled by DDOT, with DOH consultation and potential funding.
    - NPS will also be approached to implement roadside swales that will provide quality and quantity control of stormwater.

- **Residential stormwater management projects:**
    - Existing rain barrel programs will be pushed in the watershed. Gaps in knowledge about these programs or barriers to implementing these programs should be assessed by DOH.
    - Raingardens will be installed in many of the houses in the Ft. Dupont watershed. Due to the large lot size of most of these houses, most roof drains are not connected to the storm sewer systems. The aesthetic value and ecological value of raingardens are two perspectives by which these features can be introduced into the community.

- **Schoolyard stormwater management projects**
    - Two elementary schools, **Kimball Elementary School and Davis Elementary School** lie within or close to the Ft. Dupont watershed. By utilizing the schoolyard conservation program under the management of

DOH/WPD, DOH can educate young residents of the watershed about their nearby stream and the impacts of development upon the stream biota.

2.2 VISION OF COMMUNITY WATERSHED STEWARDSHIP

In the context of a highly urbanized matrix, the Ft. Dupont watershed is comparatively undeveloped and possesses qualities that make it a good candidate for integrated community stewardship. Given the numerous trails and large forested parkland, it is easy to see the benefits that this stream provides the community. The fact that the both water quality and stream morphology have worsened despite the preservation of the majority of watershed (though NPS preservation) can be a very useful tool in showing the unseen nonpoint source human impacts to the stream.

By implementation of the above referenced residential and schoolyard projects, a constituency of watershed residents can be developed. This constituency could take the form of a friend's group, a watershed group, a gardening group, or a student group. Establishing these groups will allow for future detection of nonpoint source pollution sources and create a sounding board for future DOH activities.

Particularly active and/or interested residents can tie-in to numerous citizen advisor committees that address larger Anacostia River issues. These include the Citizen Advisory Committee of the Soil and Water Conservation District, and the Citizen Advisory Committee of the Council of Government's AWRC.

2.2.1 ENVIRONMENTAL CONSTITUENCY - STARTING PLACES AND DIRECTION

Currently, the watershed has no active community groups specifically relating to environmental issues. However, a large community garden exists at the junction of Ft. Davis and Ft. Dupont Drives. This may be fertile ground from which to develop contacts with the community and forge a group that discusses and develops local environmental initiatives.

Essential for development of such a group is a consistent presence in the watershed. One-time programs such as tree plantings or classroom visits by either government or non-profit staff have little lasting effect on the watershed, if they are not part of a long-term program of community involvement. In order to create a lasting group, two things must be present. The first is a funded program that can give the group something to co-manage with the government or non-profit group, such as a rain barrel program or a rain garden program. The second is the establishment of a highly visible and easily contacted point person that can answer questions. A DC DOH staff member can act as this contact, particularly if they have a good knowledge of the community dynamics. Non-profits can sometimes serve this function if they are afforded a long-term grant for this type of work and if they have presence in the community.

2.2.2 VISION IN FT. DUPONT - PILOT RAINGARDEN PROGRAM

It was previously mentioned the there exists the opportunity to remind residents of the existing resource that Ft. Dupont stream offers and the chance to educate residents about the impacts of stormwater their local stream. Bringing these broad goals into focus with specific tasks requires further thought than provided in this brief summary. However, a potential implementation program might take the form of a cost share rain garden program.

Initial contacts made in the community garden would be followed up with meetings that would lay out the details of the program. Community member could be tasked with distributing information about the program to their neighbors. The program could provide a cost share to residents for the construction of raingardens on their property; for example the costs of the plants would be covered by the residents, with DOH/WPD staff assisting in the appropriate plant selection . Labor associated with excavation and planting as well as the costs of new piping would be supplied by the DOH/WPD. Tied into the program would be guided walks of the stream that would show the impacts of unmanaged stormwater. The combination of these activities would provide both the educational tie-in to the local resources as well as a motivation for action on the part of the individual resident of the watershed. These activities would be coordinated by DC DOH/WPD staff. The budget for such a program would fall in the $15,000 range for 50 raingardens (soil excavation and any piping at $250/garden), primarily allocated for excavation, new soil mix and educational materials. Further on-site stormwater management programs could be developed depending upon the results of this initial pilot project.

2.2.3 PUBLIC AWARENESS AND OUTREACH

Community coordination: building upon existing programs

There has been little to no involvement of the community to date in regards to the stream restoration component of Ft. Dupont. Although no homes border the stream, it is possible that nearby residents utilize the park on a regular basis. Development of a constituency in support of natural channel restoration would ensure that any restoration efforts, if undertaken, would meet with general support from community members.

One way to quickly identify community members that may be interested in participating in rain barrel and rain garden programs is to tie into current tree stewardship programs. The Casey Trees Foundation has a citizen forester program that aims to educate and empower citizens to care for street tree. Since one of the goals of Casey Trees Foundation is to mitigate the impacts of stormwater by increasing canopy coverage in the District, the goals of DC DOH/WPD to create onsite stormwater management are compatible. Tapping into these citizen forester volunteers would be an excellent way to

broaden the awareness of already motivated citizens. This group could meet separately to discuss the programs that have been suggested in this document. Ties between Casey Trees and DC DOH/WPD have already been established.

CURRENT ACTION ITEM:

Meet with citizen forester volunteers involved with the Casey Trees Foundation program. Participate in several planting evens and distribute information on the rain garden/rain barrel program. It will be important to begin to identify community members that might be the seed for a group dedicated to local environmental issues. Issues that could act as initial project include a demonstration rain garden and a rain barrel program as described in 2.2, or meetings to discuss trash issues. A rain garden pilot program is described in section 2.2.2.

LOCAL RESOURCES

Potential resources include Reggie Parish, Anacostia Liason for the EPA, Kevin Chavous, Ward 7 councilperson, Heather Langford and James Woodworth, both of the Casey Trees Foundation, Citizens Advisor Committee (to the Soil and Water Conservation Board) representative Joseph Glover, and the Anacostia Watershed Society.

2.3 VISION OF STREAM RESTORATION

Ft. Dupont represents the highest likelihood of success of any of the Anacostia tributary projects. A combination of a high percentage of forested cover, a strong level of maintenance of the area by NPS, and a comparatively high ecosystem function at the present indicate that restoration of this tributary, if undertaken correctly, would succeed in the long term.

Stream restoration as defined by DC DOH/WPD includes the following goals.

1. Provide habitat features within the stream by establishing the appropriate width/depth ratio that would be found in a stream of its type in the Atlantic coastal plain.
2. Provide the stream with a floodplain that would dissipate energy from these frequent storm events, thus reducing the erosive force of the stormwater
3. Raise the water table of the stream and ensure the health of the existing forest in Ft. Dupont Park.
4. Provide an example of how urban streams that have incised from stormwater flows can be restored to conditions that favor macroinvertabrates, fish, and the surrounding riparian ecosystem.

2.4 RELEVANCE TO REGIONAL AND LOCAL INITIATIVES

The restoration goals of Ft Dupont tributary are closely aligned with those of the *Chesapeake Bay 2000 Agreement,* as signed by the District of Columbia, Virginia, Maryland, Pennsylvania, the Chesapeake Bay Commission, and the U.S. Environmental Protection Agency. The Ft. Dupont restoration strategy will support the goals of: "Living Resource Protection and Restoration" for fish passage, "Water Quality Protection and Restoration" for reduction of nutrient and sediment loads and for the protection of priority urban waters, and by increasing stewardship of natural resources through public education and community engagement.

The Ft. Dupont stream restoration is an important component of the District of Columbia's June 2000 *Nonpoint Source Management Plan II*. The Ft. Dupont plan addresses goals for education and outreach, stream and riparian habitat restoration, and technology transfer. It will also address the reduction of pollutant loads as called for by this management plan.

CURRENT ACTON ITEM:

In order to measure the amount of sediment that is currently being lost from the banks of Ft. Dupont, DOH/EHA will install three monumented cross sections in Ft. Dupont and sets of bank erosion pins adjacent to the cross sections. These points will be measured every 6 months in order to develop a solid estimate of sediment loads from a stormwater degraded tributary.

2.5 RELEVANCE TO TMDLS

Water quality in Ft. Dupont is described in the *District of Columbia 2002 Water Quality Report to US EPA and US Congress.* The following describes the use support for various designated uses.

Use catagory	**Support of designated use**	**Criterium for support**	**Pollutant of interest**
Fish consumption	Not supporting	"No consumption" fish/shellfish advisory or ban in effect for general population	Toxics
Overall use support	Not supporting	One or more of the uses are not supported	DO, pH, temp.
Aquatic life support	Partially supporting	For any one pollutant, standard exceeded in 11-25% of measurements. Pollutants not found at level of concern.	DO, pH, temp.
Swimmable	Not supporting	For any one pollutant, standard exceeded in >25% of measurements.	Bacteria

		Pollutants found at levels of concern	
Secondary Contact Recreation	Fully supporting	For any pollutant, standard exceeded in <10% of measurements. Pollutants not found at levels of concern.	Bacteria

The nonattainment causes are listed as *pathogens* and *total toxics*. The nonattainment sources are listed as *urban runoff/storm sewers* and *source unknown*, both non-point sources. The LID implementation plans described in this document will partially address the storm sewer source and should assist in improving the use support for the first four designated uses.

The swimmable non-attainment ranking is based upon samples taken 1997-2001 that indicated a high levels of fecal coliform. A horse paddock roughly 200 yards from the stream was likely the cause of these data. Since 2001, some measures have been taken, such as an installation of a silt fence, that may have addressed this problem. Current data is needed to verify if fecal coliform levels are still a problem. Since no sewer lines run along or near the stream, contamination from a sewer leak is not likely to be the cause.

Given that the stream is ephemeral and does not contain flows adequate for swimming or fish, these designated uses are somewhat inappropriate for the size of waterbody. However, these designated uses point towards the types of pollution that are problematic within Ft. Dupont. Given that the problems are of a non-point source nature, the recommendations contained within this document in totality will address the water quality problems seen in this tributary.

3.0 IMPLEMENTATION

Implementation of all of the suggestions contained in this WIP rely upon coordination and cooperation of sister DC agencies, federal landowners and other partners, and residents. As important as the actual content of the various projects is the development of institutional and community ties that will assist in negotiation the successive hurdles of bureaucracy, regulatory requirements, procurement issues, and contracting issues. Each of the different types of activities demands different ties and coordination.

Residential implementation: Community outreach will identify likely participants and will go a long way in ensuring initial success of any community-based project. This requires investigation into the interests of various residents of a watershed. There are numerous ways of gathering this information, however the importance of finding a receptive audience cannot be underestimated.

Incentives for participation are important in expansion of a program beyond the handful of initially interested participants. Cost shares can provide a good mechanism that both assist the project at the same time as developing a commitment from the resident. Mechanisms for implementing a cost-share agreement need to be worked out. Given District procurement policies, it may be easier to have a qualified non-profit administer the cost share under close supervision of DC DOH/WPD staff.

Institutional implementation: By definition, watershed restoration crosses jurisdictional, political, and geographic barriers. If not handled delicately, these distinctions in ownership and regulatory authority can stop any project when one vested party does not participate. Avoiding these potential hang-ups requires first identifying the stakeholders with regulatory authority or landownership rights. Any agency without these authorities or rights should not be ignored but should not be given a perceived "right or authority" over the proposed implementation activities.

With those stakeholders with authority, partnerships need to be forged that will allow for implementation. These partnerships need the teeth of interagency mandates that spell out DOH's authority to implement BMP's and stream restoration on land owned by NPS or managed by other DC agencies. DOH, with backing from EPA, should be the lead in establishing these formal agreements. In Ft. Dupont, vested stakeholders include National Park Service, US Army Corps of Engineers, DC Department Of Transportation, DC Dept. of Public Works, and DC Dept. Parks and Recreation.

Internal implementation: Development of the ability to issue contracts from the DC DOH/WPD to a variety of contractors is key to timely implementation of the activities listed in this document. Without the ability to issue contracts to cover components of stream restoration or on-site stormwater management, DOH/WPD is required to partner with agencies that may have different goals and objectives. Some of these goals and objectives may match those of the Watershed Protection Division, but usually these interests divert in topic, timing, or scale. Development of a list of preferred contractors that can implement essential components of these watershed restoration plans will allow for improvements in water quality, habitat, and aesthetics.

3.1 STORMWATER MANAGEMENT

Locations appropriate for LID/stormwater management in the Ft. Dupont subwatershed can be found in Appendix 1.

3.1.1 IMPLEMENTATION OF STORMWATER MANAGEMENT

Partnership development (institutional):

Installation of onsite stormwater management requires the active solitication and partnering with appropriate municipal, federal, and residential parties. Given that most of these facilities are intended to treat stormwater from residential and National Park roads, the District Department of Transportation (DDOT) and the National Capitol Parks East will need to be convinced of the importance of these small onsite facilities. In Ft. Dupont, the greatest positive impact from stormwater management could be attained through comprehensive treatment of 1: Massachusettes Avenue, 2: Ft. Dupont Drive 3. Ridge Road from Ft. Davis to Burns Road 4: Alabama Road 5: Burns Road 6: The NPS Ice Rink parking lot. All of these areas could be treated without extensive community outreach, however this may be beneficial in building support. Given the political cache of the Anacostia Watershed Initiative, these projects may give cooperating agencies public credit towards fulfilling their commitment of improving the Anacostia River.

Partnership development (community):

Additional treatment of water quantity and quality could be achieved by residential on-site management. The homes in the upper portions of the Ft. Dupont watershed typically have large lots and disconnected roof drains. A concentrated public education effort could change this informal onsite treatment to a more effective treatment such as rain barrels, rain gardens, and/or infiltration trenches. This could be done through programs that give away rain barrels and provide technical assistance in the creation of rain gardens. A non-profit may be solicited to manage this program, however DC DOH/EHA oversight of the project would be required to ensure that the installation is correct and the message is conveyed in a consistent way.

Additional issues that will need to be coordinated are:
Concerns regarding west nile virus. Rain barrels should be issued with larvacide or screens that will keep out mosquitos.

Erosion/ construction plans: Assistance and fast-tracking of sediment erosion control plans should come from DOH/WPD's technical plan review division. It is essential that bureaucratic delays and headaches should be eliminated in order to eliminate any disincentives for participating in this project.

3.2 STREAM RESTORATION

3.2.1 PAST EFFORTS

DC DOH/EHA has partnered with the US Army Corps of Engineers (Corps), Baltimore District in the conception, design, and potential funding of stream restoration alternatives. Corps contractors have developed 30% designs (conceptual) that were rejected by the National Park Service (NPS). Further discussion and meetings have revealed that the NPS position is that natural channel stream restoration is not desired or necessary in Ft. Dupont. Without explicit and implicit support from the NPS, stream restoration and its expected benefits will not be possible. However, some remedial efforts may be agreeable to NPS.
These are:

- Removal of a culvert next to the summer theater.
- Removal of a culvert at the site of the "old golf course."
- Daylighting of Ft. Dupont west of I 295 and potential connection with Pope Branch.

The last of these measures could be expected to have some habitat benefits. It could be included into the Lower Anacostia Park/Pope Branch project. However, due to the overwidening of the lower sections of the stream, the removal of culverts on their own will not increase base flow depths in the stream and thus will not support fish populations.

3.2.2 IMPLEMENTATION OF STREAM RESTORATION EFFORTS

Institutional coordination:

In order to proceed with Ft. Dupont stream restoration, a clear delineation of measures acceptable to the National Park Service will be required. These measures must be assessed by DC DOH/EHA and the Corps in order to determine if the measures will significantly improve stream habitat, reduce sediment contributions to the Anacostia, and provide any remediation of non-point source pollution.

The streamlining of institutional partners is essential in order to build consensus on a controversial project such as Ft. Dupont. The inclusion of partners without financial or jurisdictional standing has led to stymied negotiations and unproductive meetings.

It is recommended that alternative federal agencies be solicited that may have more credibility and experience in the field of stream restoration in order to build consensus amongst all DC stakeholders.

CURRENT ACTION ITEM:

As soon as the Army Corps produces 60% designs, forward to the NPS for comments.

4.0 PROJECTED SOURCE LOAD REDUCTIONS

Based upon the latest numbers for load reductions as supplied by the EPA Chesapeake Bay Program technical review group, the follow represent the expected load reductions that could be achieved by implementing the actions presented in this document.

	TN reduction	TP reduction	TSS reduction
Stream restoration	**158 lb/yr**	**27.72 lb/yr**	**20,196 lb/yr (10.1 tons)**
Removal efficiencies for bioretention cells	**40 %**	**60%**	**85 %**
Removal efficiencies for infiltration trenches	**50%**	**70%**	**90%**
Total LID reductions	**1069 lbs/yr**	**196 lbs/yr**	**7,501 lbs/yr**
Total potential reduction (lb/yr)	**1,227**	**223.72**	**27,697**

			TN		TP		TSS	
Location	BMP Type	Acres	Load [lbs/yr]	Rdx [lbs/yr]	Load [lbs/yr]	Rdx [lbs/yr]	Load [lbs/yr]	Rdx [lbs/yr]
Ridge road next to Rec. Center	Bioretention cell	2.18	277	111	36	21	1042	886
Burns Road from Ala. to Ridge	Infiltration trench	0.671	85	43	11	8	321	289
Burns Road & Alabama	Bioretention cell	0.44	56	22	7	4	210	179
Alabama Ave from Burns to Mass	Infiltration trench	1.24	157	79	20	14	593	533
Mass Ave from Ala. to Minn	Infiltration trench	5.45	692	346	89	63	2605	2344
John P. Sousa Middle School	Green roof	0.21	27	11	3	2	100	85
Ft. Dupont Dr.	Infiltration trench	2.18	277	138	36	25	1042	938
Ice Rink Parking lot	Infiltration strip	2.48	315	157	41	28	1185	1067
Access road to refueling station	Infiltration strip	0.582	74	37	10	7	278	250
Parking lot outside of refueling station	Infiltration strip	0.265	34	17	4	3	127	114
Ridge Road from Ft. Davis/Ridge to G St.	Infiltration trench	0.727	92	46	12	8	347	313
Ft. Dupont "activities center"	Bioretention cell	1.24	157	63	20	12	593	504
				1069		196		7501

5.0 TIMETABLE AND BUDGET

Action item	**Finish date**	**Financial resources required**	
Corps finishes feasibility study (60% designs)	12/04	No cost to DOH unless project moves ahead	
Issue NOGA for LID or partner with DDOT for construction in Ft. Dupont watershed at areas mention ed in Ft. Dupont WIP	3/04	$170,000 for LID (stormwater management) work in selected areas	
Initiate community outreach (hold activity) **Develop list of community members** **Build a pilot raingarden program**	Activity by 8/04	Staff time $8,000 for planting material for 20 raingardens in Ft. Dupont watershed	
Work with Corps to come up with an instream restoration design agreeable to NPS	12/04	Estimated DC cost: $500,000	Dependent upon NPS agreement
Utilize existing grant agreements (ie. Rain barrel giveaways)	ongoing	No additional funds	Work with rain barrel grantee (Alliance for the Ches. Bay)

5.1 DELIVERABLES

Deliverables for the above action items include:

- **Corps finishes feasibility study (60% designs)**

Deliverable: 60% designs and feasibility document

……..

- **Issue NOGA for LID construction in Ft. Dupont watershed at areas mentioned in Ft. Dupont WRAS**

Deliverable: Notice of Grant award and selection of non-profits and stormwater management sites.

……..

- **Initiate community outreach (hold activity)**
- **Develop list of community members**
- **Utilize existing grant agreements (ie. Rain barrel giveaways)**

Deliverable: Documentation showing community meetings, participants, and selection of demonstration project(s).

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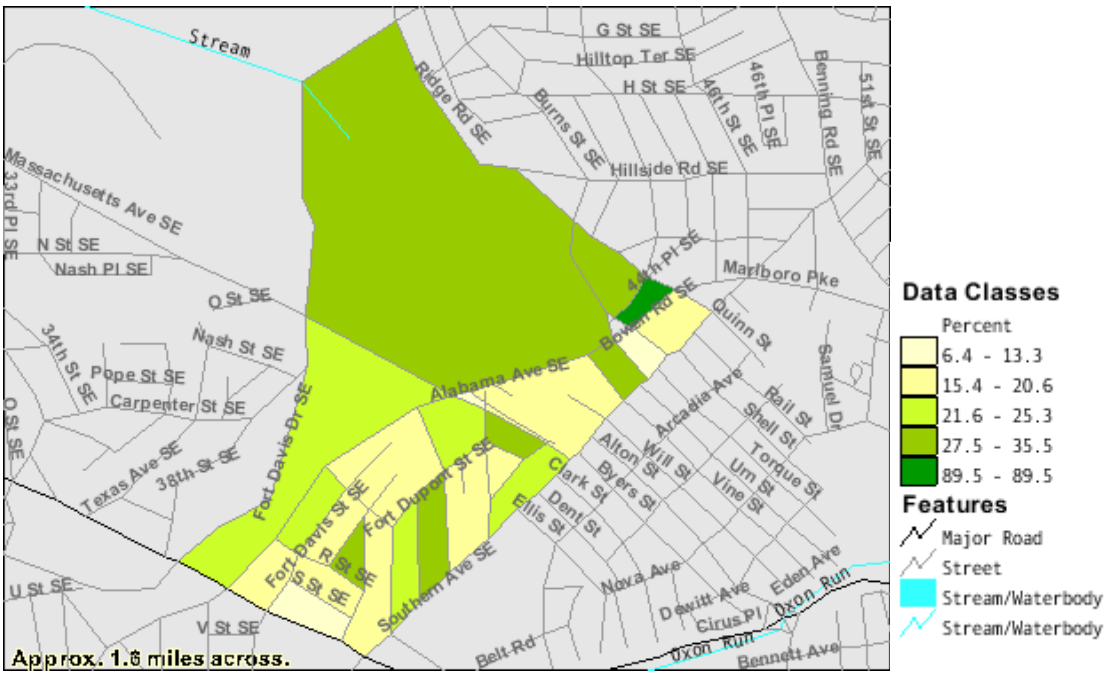
- **Work with Corps to come up with an instream restoration design agreeable to NPS**

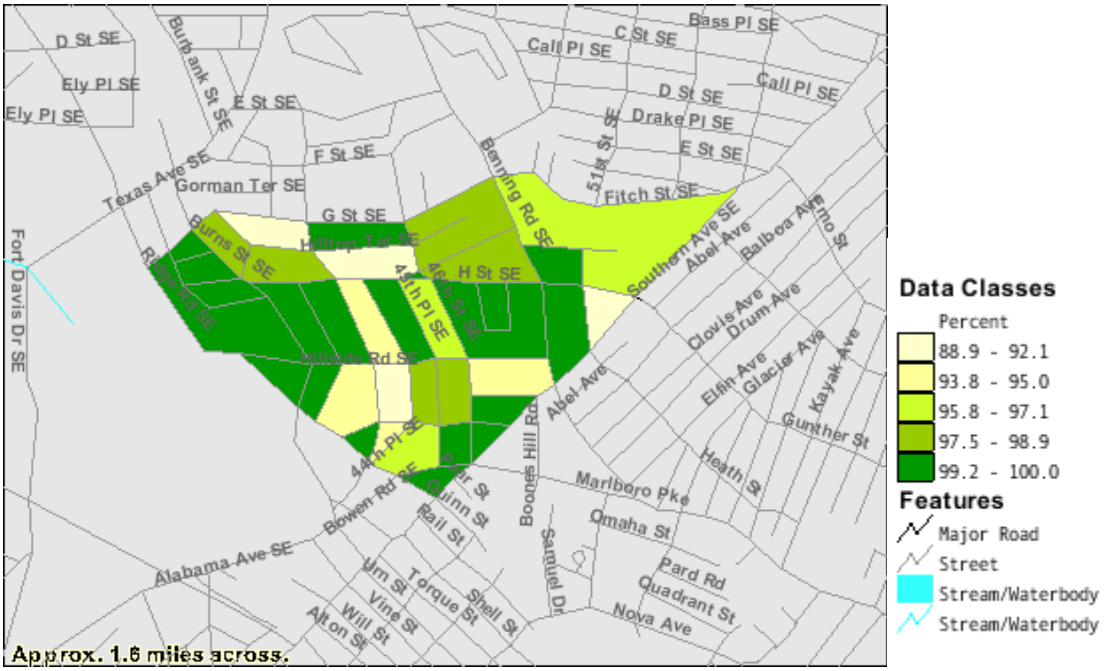
Deliverable: Documentation of meetings with NPS. Written comments from NPS on designs.

6.0 DEMOGRAPHICS

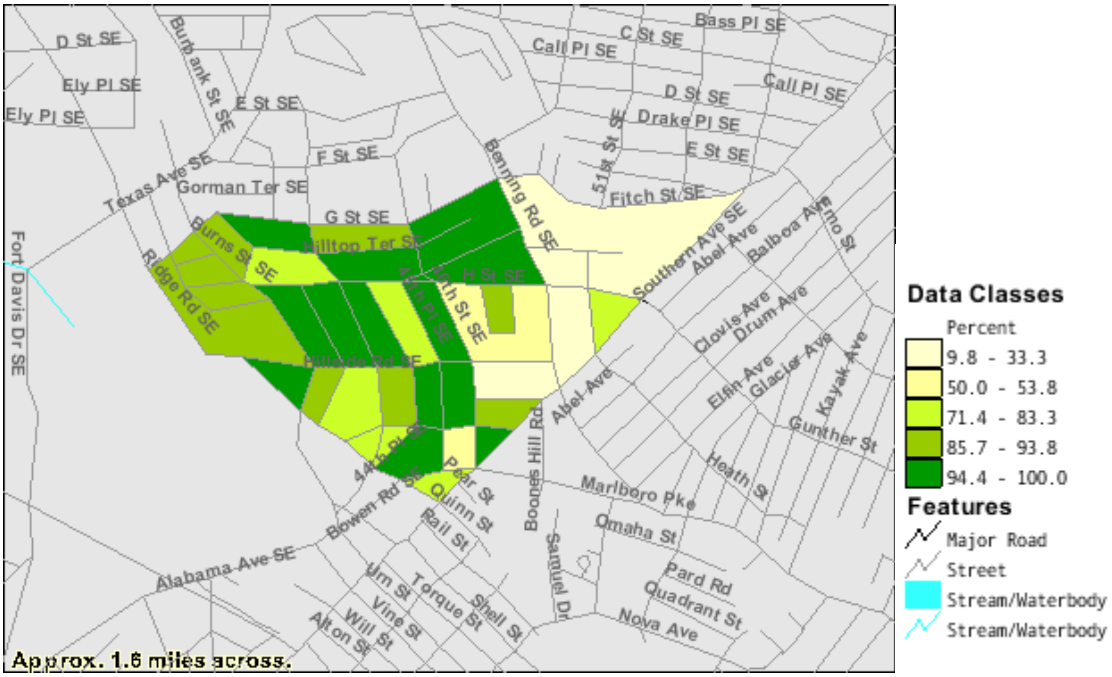
The Ft. Dupont watershed is covered by more the 3 census tracts: 77.07, 99.02 (headwaters), 77.08, 77.09, 99.01 (lower). The maps and tables presented below are available at www.census.gov. Although much information can be gleaned from this website, some trends quickly present themselves. The neighborhoods surrounding Ft. Dupont are predominantly African-American and the housing stock is predominantly owner occupied. The population is generally older (median age - 49 years old, census tract 99.01) and 40 percent of the households have residents aged 65 years or older (27 from "family households," 13 from "non-family" households). Given the nature of working resident's time constraints, the population that can be easily engaged is predominantly retired, African-American persons. These population data suggest that a demonstration project such as a rain garden project would fit well with a group that typically has free time and typically spends some of it on activities such as gardening, yard work, and house maintenance.



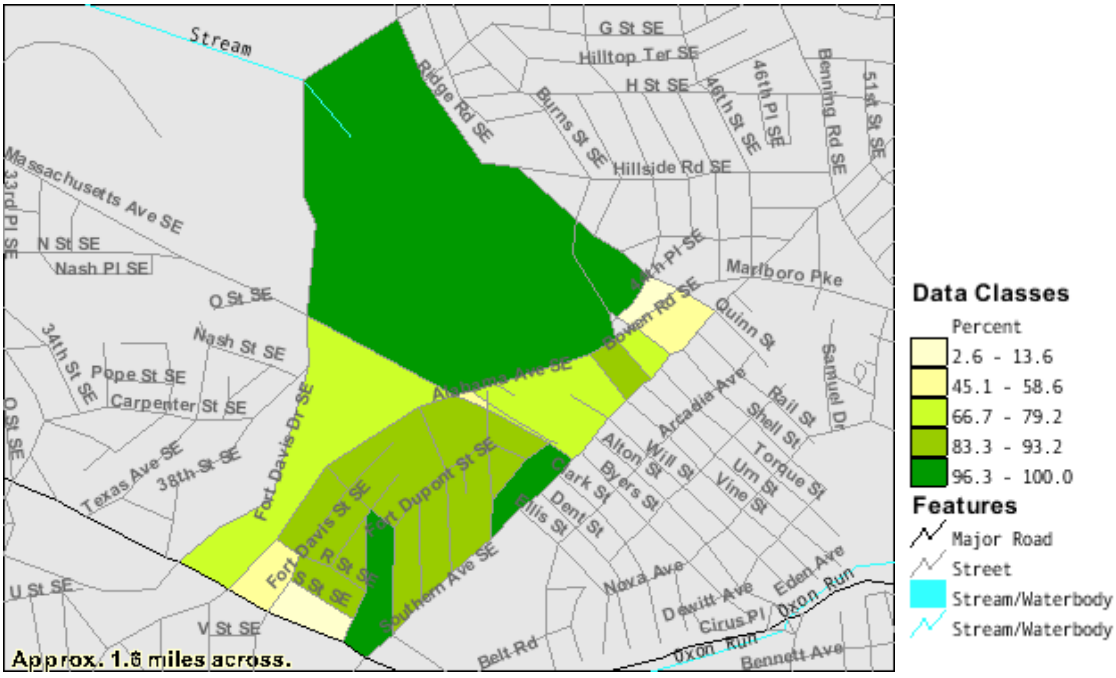
TM-P020. Percent of Persons 65 Years and Over: 2000.
Universe: Occupied housing units
Current Data Set: Census 2000 Summary File 1 (SF 1) 100-Percent Data
Census Tract 99.02, District of Columbia



TM-PL0003B. Percent of Persons Who Are Black or African American Alone: 2000
Universe: Total Population
Current Data Set: Census 2000 Redistricting Data (Public Law 94-171) Summary File
Census Tract 77.07, District of Columbia



TM-H004. Percent of Occupied Housing Units That Are Owner-Occupied: 2000
Universe: Total Population
Current Data Set: Census 2000 Redistricting Data (Public Law 94-171) Summary File
Census Tract 77.07, District of Columbia



TM-HOO4. Percent of Occupied Housing Units That Are Owner-Occupied: 2000
Universe: Occupied housing units
Current Data Set: Census 2000 Summary File 1 (SF!) 100 Percent Data
Census Tract 99.02, District of Columbia

6.1 POLITICAL REPRESENTATION

Ft. Dupont is located entirely within Ward 7 and the current council member representing the area is Kevin Chavous. No community groups relating to natural resources, gardening groups, or other potential environmental stewards currently exist. The population is predominantly African American (>95%) and households fall within the low to middle income range (20-50 k/yr).

6.2 DISTRICT AGENCY CONTACTS

DDOT - Allen Miller, Supervisory Civil Engineer: allen.miller@dc.gov

DCP&R - Michael Lucy, Large Parks Administrator: michael.lucy@dc.gov

National Park Service, National Capitol Parks East - Stephen Syphax, Chief, Resource Management Division: stephen_syhpax@nps.gov

WASA - John Trypus, Engineer, Planning and Design, john.trypus@dcwasa.com

6.3 STAKEHOLDER FEEDBACK

From October 2003 to February 2004, this Watershed Implementation Plan was circulated among all stakeholders for review. Any comments received were incorporated into this document. It should be noted that the document was sent to the US Army Corps of Engineers, National Park Service, DDOT, DCPR, and Casey Trees Foundation. Only the Casey Trees Foundation supplied comments to DC WPD.

7.0 REFERENCES

DC Department of Health. 1998 Water Quality Report to US EPA and Congress.

Banta, W.C. 1993. Biological water quality of the surface streams of the District of Columbia. Occasional Publications, Department of Biology, American University, Washington, DC 20016. Volume 2, no. 1.

Metropolitan Washington Council of Governments. February 2001. Ft. Dupont Stormwater Retrofit Feasibility Evaluation.

Metropolitan Washington Council of Governments. April 2000. Ft. Dupont Subwatershed Restoration: 1999 Baseline Stream Assessment Study- Physical, Chemical and Biological Conditions.

The Bioengineering Group. 2001. Ft. Dupont Watershed, Final Ecosystem Restoration Report.

USDA, Soil Conservation Service. 1993. Planning Report: Watts Branch Watershed.

Appendix 1 : LID/Onsite stormwater management locations

Locations appropriate for LID/stormwater management in the Ft. Dupont subwatershed

Address	Type	Area Treated (in sq. ft. & acres)	Feasibility	Notes	What is specifically required in terms of road alteration?
	FT DUPONT	**WATERSHED**			
Ridge Road (next to DCP&R Rec center	Bioretention cells	95,040 sq. ft **2.18 acres**	Med-high	Some excavation necessary on N side, S side abuts NPS property - this stormwater is responsible for broken storm pipe emptying into stream, severe stream downcutting	**Curb cuts, some excavataion to allow for proper drainage**
Burns Rd Btw. Alabama & Ridge	Infiltration trenches/ Tiered	29,250 sq. ft **.671 acres**	Med-High	High slope, the trenches might need to be tiered to allow for infiltration / this stormwater resp. for high degree of stream entrenchment	**Currently there is no curb, repair of road could be done to allow for finished edge and sheet flow off into NPS property**
Alabama & Burns area	Infiltration - bioretention cell in grassy triangle at intersection	19,125 sq. ft **.44 acres**	Med	Triangle would need flow diversion across Burns, infiltration along Alabama would be easy (plenty of room)	**Flow diversion "asphalt ridges" to divert water into the "triange"**
Alabama Ave - from Burns to Mass	Infiltration trenches/rain gardens	53,856 sq. ft **1.24 acres**	High	Plenty of room on roadsides (on west side)	**Curb cuts, minor excavation**
Mass Ave (from Ala. To Minn. Ave.)	Curb cuts, infiltration trenches	237,600 sq. ft **5.45 acres**	High	Plenty of room on both sides (storm drains available for overflow)	**Curb cuts, minor excavation**
John P. Sousa middle school	Potential green roof/ rainbarrels	9,000 sq. ft	?	Outside of Ft. Dupont subwatershed but potentially a good partnership w/ school	**No coordination with DDOT, coordination with DCPS system needed**
Total non-nps		**9.981 acres**			
Ft. Dupont	**ON NPS LAND**				
Ft. Dupont Drive	Infiltration Ditches	95,040 sq. ft **2.18 acres**	Very High	Concrete channel in roadside ditch could be replaced with grass	**No alteration to road, roadside swale might need some exacavation and addition of porous soil**

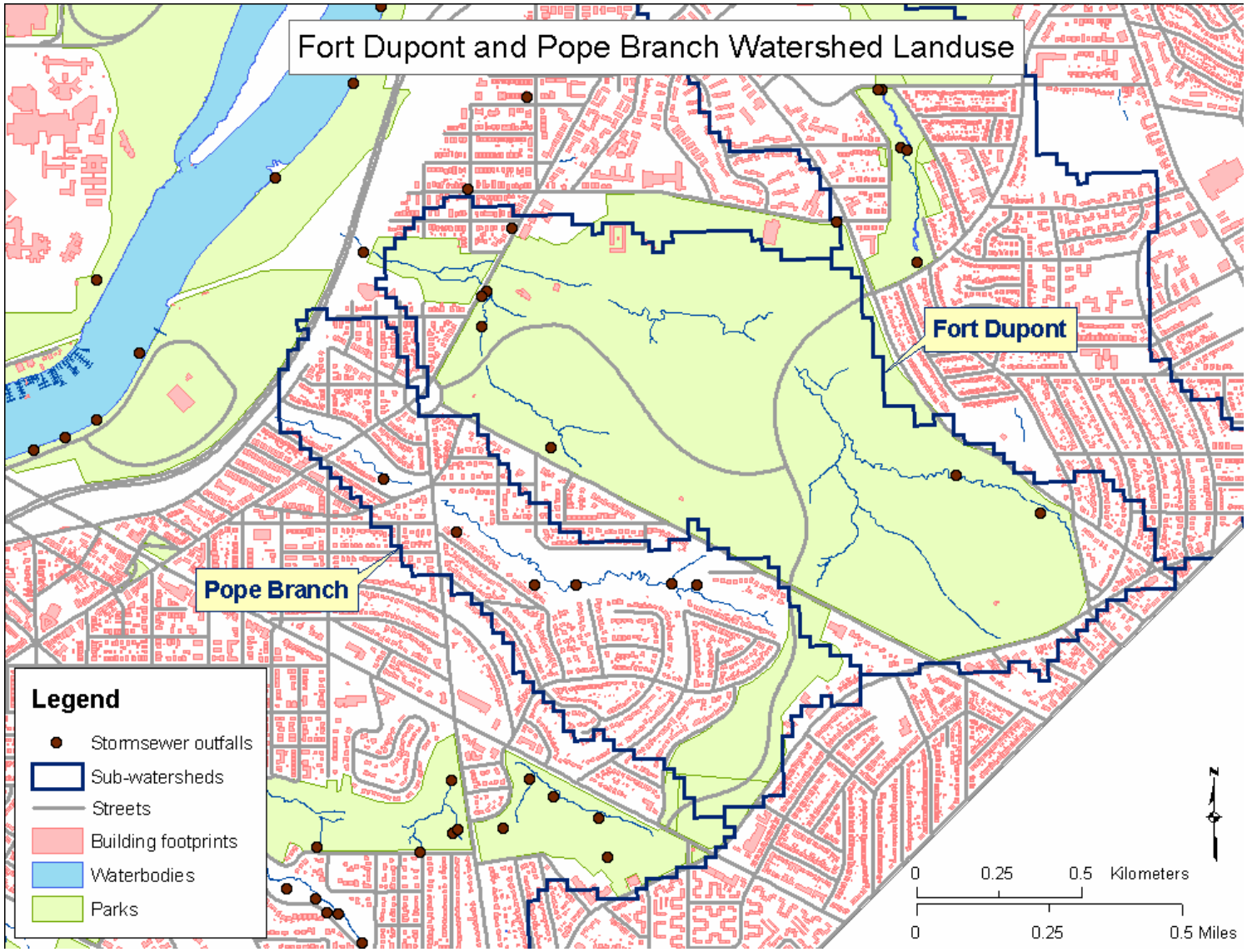
					mixture
Ice Rink parking lot (Ely st)	Infiltration strips in parking lots	108,000 sq. ft **2.48 acres**	High	Large lot, grading is not right to divert into parking medians (infil. Strips better)	**Minor alteration of parking lot, some flow deflectors**
Access road to Refueling station (fleet maintenance)	Curb removal	25,344 sq. ft **.582 acres**	High	Easy to divert stormwater to grassy areas at side of road	**Curb cuts, flow diversion into biocells**
Parking lot outside of Refueling station	Infiltration strips, or small biocell	11,532 sq. ft **.265 acres**	High		**Curb cuts**
Ridge Road (from Ft. Davis/ Ridge intersection to G St.)	Infiltration trenches, on NPS side of road. Only ½ of road "treated"	31,680 sq. ft **.727 acres**	Med	Excavation necessary	**Curb cuts**
Ft. Dupont "activities center"	2-3 biocells in parking lot	53,820 sq. ft **1.24 acres**	High	Minor excavation necessary	**Curb cuts**
Total NPS land		**7.474 acres**			
Total treatable impervious surface in Ft. Dupont subwatershed		**17.455 acres**			

Appendix 2: Pollutant removal efficiencies for stream restoration and LID

The following table shows the most recent efficiencies that have been reported by Chesapeake Bay Program staff. Only the practices likely to take place in the Ft. Dupont subwatershed are listed. It is important to note that these numbers are rough estimates only, and that new efficiency percentages are being develop at present.

BMP category	Pollutant Removal Efficiency		
	TN	TP	TSS
Pocket pond[1]	28	78	87
Dry pond[1]	25	19	47
Infiltration Practices (general)[1]	50	70	90
Infiltration Trench[2]	40-60	40-60	80-100
Porous Pavement[1]	83	65	95
Infiltration facilities (w/ storage volume=1.0 in runoff)[3]		65	
Underground sand filter[4]	35	50	80
Bioretention areas (rain gardens)[1]	49	50-65	86
Sheet flow to roadside filter strips[2]	0-60	0-60	20-100
Oil grit separators[4]	5	5	15
Stream Restoration[5]	0.02 lb/lin. ft	0.0035lb/lin. ft	2.55lb/lin ft

1 National Pollutant Removal Performanc Database for Stormwater treatment practices. Center for Watershed Protection; June 2000 - median pollutant removal for 139 studies over a 22 year period.
2 Low Impace Development Design Stategies: An integrated Design Approach. Prepared by: Prince George's County, MD and Dept. of Env. Resources, Program and Plannign Division. June 1999
3 VA Stormwater Handbood, www.dcr.state.va.us/sw/stormwat.htm
4 BMPs in the Anacostia Watershed (References or Sources for BMP removal) 9/14/01 - Researched by Timothy Karikari, Professional Engineer.
5 Data Collected from the Spring Branch Stream in Baltimore County, MD. Removal efficiency rates based on monitoring data from 1 year prior to restoration and 3 years after restoration.


Fort Dupont and Pope Branch Watershed Landuse
Fort Dupont
Pope Branch
Legend
Stormsewer outfalls
Sub-watersheds
Streets
Building footprints
Waterbodies
Parks
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0.25
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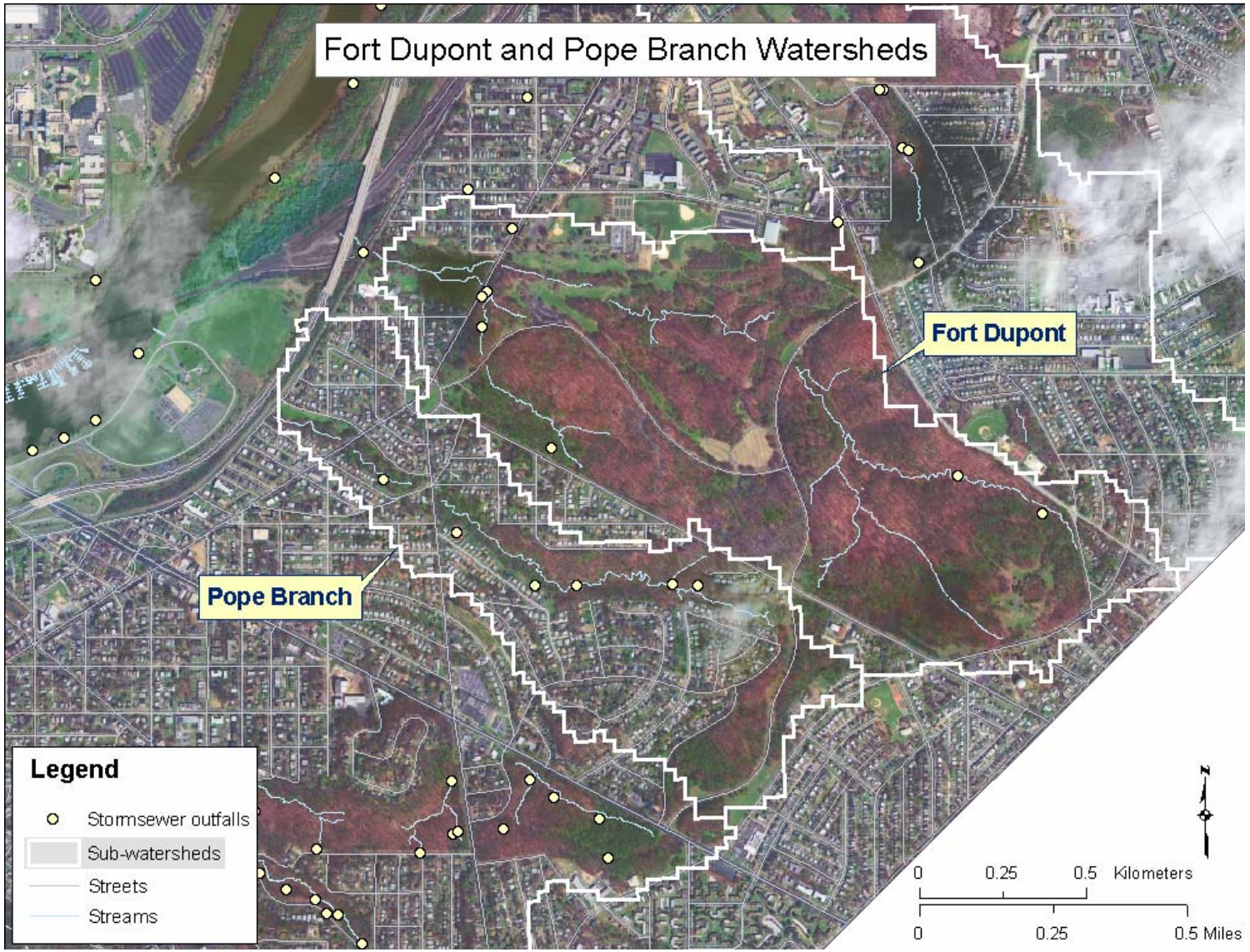
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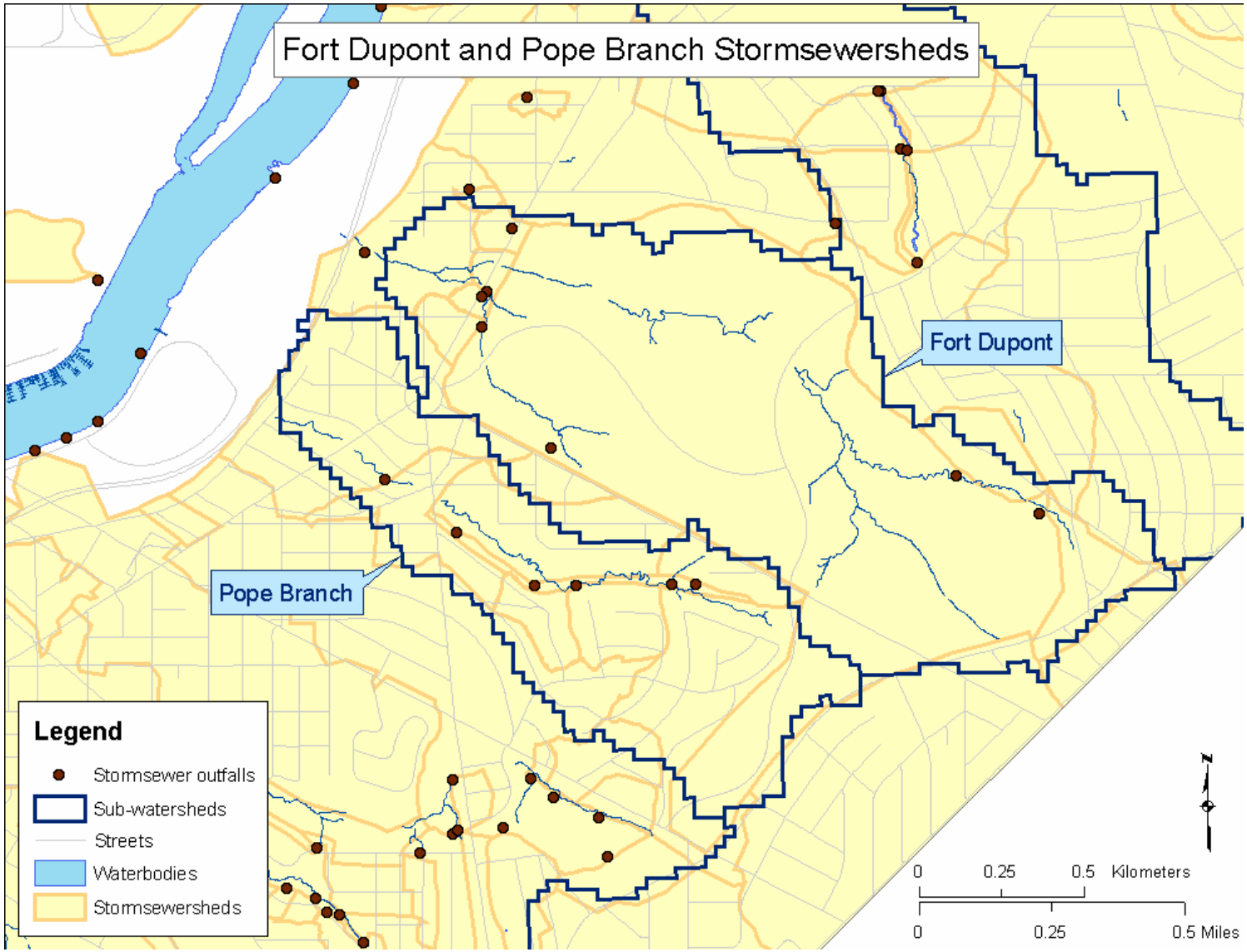
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Fort Dupont
Pope Branch
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